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Ownership Structure, Deregulation, and Bank Risk Taking

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ABSTRACT

This paper investigates the relationship between bank ownership structure and risk taking. It is hypothesized that stockholder controlled banks have incentives to take higher risk than managerially controlled banks and that these differences in risk become more pronounced in periods of deregulation. In support of this hypothesis, we show that stockholder controlled banks exhibit significantly higher risk taking behavior than managerially controlled banks during the 1979–1982 period of relative deregulation.

IN THIS PAPER WE analyze the relationship between risk taking by banking firms and their ownership structures. In particular, we concentrate on the potential conflict of interest over risk taking between managerially controlled banks (defined as banks whose managers hold a relatively small proportion of the banks' stock and act in their own utility-maximizing interests) and stockholder controlled banks (defined as banks whose managers hold a relatively large proportion of the bank's stock and act in the stockholder's value-maximizing interest).

This conflict of interest is important partly because others have already documented an inverse relationship between *non*-bank firm risk taking and the degree of managerial control[1] and partly because of the presence of a third party or set of agents ("bank regulators") who by their actions define the general set of rules and regulations regarding bank risk taking. Specifically, by changing the regulatory environment, for example toward activity and interest rate deregulation and/or closure rule forbearance, any conflicting risk taking incentives of stockholders and managers can be accentuated and the degree of risk taking by stockholder controlled banks increased. Thus, we expect to find ownership structure having a more powerful effect on the risk characteristics of banks in periods of deregulation relative to periods of regulation.

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[1] See Amihud and Lev (1981) and Agrawal and Mandelker (1987), for example.

In Section I the conflict of interest between managers and stockholders over the degree of bank risk taking is briefly described. In Section II a model is specified that links measures of bank risk to a measure of the ownership structure of the bank and a set of other control variables. In Section III tests are conducted on the model to determine the empirical relationship between these capital market measures of bank risk and ownership structure, as well as on the sensitivity of this relationship to changing regulatory regimes. Finally, Section IV is a summary and conclusion.

I. The Conflicting Risk Preferences of Bank Stockholders and Managers

A. Stockholders

The incentive for limited liability stockholders to increase the risk of the firm by increasing leverage has been widely noted. (See Galai and Masulis (1976), for example.) In particular, to the extent that debtholders (depositors) can only monitor and control stockholders' actions imperfectly and ex post, stockholders can increase the value of their equity *call* options by increasing the risk of the underlying assets of the bank (firm). In addition, Merton (1977), Marcus and Shaked (1984), and Ronn and Verma (1986), among others, have argued that the current system of levying fixed-price (risk-insensitive) deposit insurance premia results in a *put*-option-like subsidy to bank stockholders—the value of which also increases with bank risk.

However, the ability of a bank's stockholders to maximize the value of their call and put options by increasing risk depends in part on the preferences of the bank's managers (see below) and on the costs, constraints, and restrictions imposed on bank risk taking by regulators (see Buser, Chen, and Kane (1981)).[2] In periods of bank activity deregulation and forbearance over closure rules, bank stockholders, ceteris paribus, have greater incentives (and ability) to increase risk taking than when regulations are tight and strictly enforced.

B. Managers

The risk taking incentives of bank managers will depend on the degree to which their best interests or preferences are tied to those of value-maximizing stockholders. If managers' wealth is largely in nondiversifiable human capital (bank-specific) form, they may act in a *risk-averse* rather than a value-maximizing manner (see Kane (1985) and Benston et al. (1986)), in which case their optimal degree of risk taking would be less than that desired by stockholders. However, by giving managers stock or stock options in the banking firm, their interest will become more closely aligned with those of stockholders, as long as their increased *non*-human wealth investment in the firm is not so large as to make them increasingly sensitive to the (potentially undiversifiable) nonsystematic risk of the bank. To the extent that the latter effect is present, this would

[2] Buser, Chen, and Kane (1981) view such restrictions as akin to implicit deposit insurance premiums that get more stringent as bank risk taking increases.

tend to mitigate the value of managerial stock-ownership plans as incentive conflict control devices.[3]

II. Testable Hypotheses on the Relationship between Risk and Ownership Structure

In this and the following section we test the following *two* hypotheses:

H1: Stockholder controlled banks are more risky than managerially controlled banks.

H2: Risk taking differences between stockholder and managerially controlled banks increase during periods of relative deregulation.

To test H1 and H2 we specify the following model:

$$\sigma_i = f(O_i, FL_i, OL_i, S_i), \tag{1}$$

where σ_i is the risk of the ith bank, O_i is the ownership structure of the ith bank, FL_i is the financial leverage of the ith bank, OL_i is the operating leverage of the ith bank, and S_i is the size of the ith bank.

This model differs from Demsetz and Lehn (1985), who view σ_i (risk) as *exogenous* and ownership structure as *endogenous* in a test methodology (for non-bank firms) similar to equation (1). In their view of the world, the noisier (the more risky) the environment the greater the incentive for stockholder-owners to change the control structure of the firm toward greater stockholder control. Our view, especially for banks, is that financial portfolios are much more flexible in the short term than ownership structures. That is, transaction costs of stockholders changing ownership structures endogenously, e.g., through the market for corporate control, should outweigh the transaction costs of changing the structure of bank (financial) portfolios to alter risk—such as changing the composition of a bank's deposits, loans, and securities. Hence, in the *short term* at least, risk taking can be viewed as an endogenous decision of the bank impacted by its ownership structure, other control variables, and the regulatory environment.[4]

The variables in equation (1) were measured as follows:

Bank Risk (σ_i)

As in Amihud and Lev (1981), we concentrate on capital market measures of firm (bank) risk. It was assumed that a two-index market model was the appropriate return-generating process for bank stock returns. (See, for example, Flannery and James (1984), Sweeney and Warga (1986), and Kane and Unal (1988).) The *two*-index market model suggests four different capital market measures of risk: σ_s (total return risk), σ_ϵ (nonsystematic risk), β_m (market risk),

[3] The importance of managers' exposure to nonsystematic risk of the firm as a result of stock ownership plans will depend on the extent to which managers' *non*-human wealth is invested in the firm's stock and therefore on the limits to their ability to diversify their *non*-human wealth.

[4] We measure risk taking and ownership structures over the relatively short one-year period, whereas Demsetz and Lehn measure capital market risk of a five-year period.

and β_I (interest rate risk). A high β_I coefficient (in absolute terms) is *consistent* with a bank mismatching the duration of its assets and liabilities, i.e., being exposed to greater interest rate risk—see Flannery and James (1984). The measure of unexpected changes in interest rates is the same as that used in Sweeney and Warga (1986) and Kane and Unal (1988), i.e., the daily change in yields. Two alternative interest rate series are used: DRI's 3-month Treasury bill (bond equivalent) yield and 10-year note yield series. Thus, we estimate a series of β_I's for both short (S) and long (L) rates for each bank. The two-index market model is estimated using daily CRSP file stock data for each bank, the CRSP equally weighted market index, and DRI interest rate data each year over the period of analysis. Thus, for each bank (a sample of 38), we generate an 8-year time series for σ_s, σ_ϵ^S, β_m^S, β_I^S, σ_ϵ^L, β_m^L, and β_I^L, where the superscripts S and L indicate estimates derived from (alternatively) a two-index model with short rates (S) or long rates (L) as the second factor.[5]

Ownership Structure (O_i)

We measure the degree of stockholder control by the proportion of stock held by banking firm managers (*PROP*),[6] measured each year for each bank from bank proxy statement data. As discussed in Section I, by increasing managers' stock ownership in the firm their risk taking incentives become more closely aligned to those of stockholders as long as their ownership stake is not so large a proportion of their *non*-human wealth as to make them overly concerned with (averse to) the nonsystematic risk of the bank.[7] Thus, it is hypothesized (H1) that *PROP* should be positively related to σ_i.

Financial Leverage (FL_i)

Following Lev (1974), highly leveraged firms tend to exhibit greater stock return variance. To control for this leverage effect, we used the bank's book value of capital to assets ratio (*KA*) since this is the leverage measure most commonly monitored by regulators and outside investors. A high *KA* (low leverage ratio) should be negatively related to bank risk.

[5] We also examined various accounting measures of interest rate and credit risk, but, in general, these performed poorly.

Brickley and James (1986) argue that, because the value of deposit insurance guarantees rises during periods of deregulation and regulator forbearance, capital market risk measures tend to underestimate the true level of asset risk. If this is so, then a finding of a relationship between capital market risk measures and ownership structure—during a period of relative deregulation—probably underestimates the strength of the true relationship. That is, the tests are biased against us finding such a relationship.

[6] Specifically, *PROP* is estimated as the number of shares beneficially held by executives and directors plus the number of shares related to their unexercised options divided by the total number of shares outstanding plus the number of shares related to unexercised options.

[7] Clearly, whether the incentives toward risk taking resulting from managerial stock-ownership plans outweigh the disincentives is an empirical question that should be reflected in the explanatory power of the *PROP* variable.

Operating Leverage (OL_i)

Mandelker and Rhee (1984), among others, have argued that operating leverage acts in an analogous fashion to financial leverage in increasing firm risk. The most commonly used proxy of operating leverage, and the one used in this study, is the ratio of fixed assets (assumed to mimic fixed costs) to total assets. This ratio (*FAA*) is expected to be positively related to our risk measures.

Bank Size (S_i)

The larger a bank the greater should be its potential to diversify its asset risk. Alternatively, the larger the banking firm the more information that is likely to be collected by financial analysts and the lower the information risk from holding its stock. (See Banz (1981).) Finally, investors may believe that regulators are unwilling to let larger banks fail, in which the value of implicit failure guarantees rise with bank size. Each of these three effects suggests that size (measured here by total assets (*TA*)[8]) and risk should be negatively related.[9]

The Regulatory Environment

As discussed in this paper's introduction, regulators define the general constraints and regulations on bank risk taking behavior. In periods of deregulation and regulator forbearance, the ability of stockholders to maximize the value of their call and put options by greater risk taking is enhanced. Consequently, it was hypothesized (H2) that *PROP* should have a more powerful effect on bank risk taking in a deregulated subperiod.

The period 1979–1982 is widely acknowledged to have been a period of significant interest rate and bank activity deregulation as well as increased regulator forbearance. Specifically, the Fed changed its monetary policy operating targets away from interest rates toward *non*-borrowed reserve target in (October) 1979 and maintained this policy until (October) 1982. This led to a considerable increase in interest rate volatility over this period. (See Saunders and Urich (1988).) Moreover, in 1980 and 1982 through, respectively, the DIDMCA and Garn-St. Germain Acts, comprehensive bank deregulation packages were passed by Congress. Further, the 1980–1982 period was one of increased regulator

[8] We reran all the tests using the market value of bank equity as an alternative proxy for size without any substantive effect on the results. (The Pearson correlation coefficient between total assets and the market value of bank equity was .93.)

[9] Sensitivity tests were also conducted by adjusting the total assets figures in the financial and operating leverage measures by an average annual loan sales measured from the figure reported in Schedule L of the *Call Report* over 1983–1985. This adjustment has no substantive effect on the results.

We also experimented with different proxies for the market for corporate control: in particular, dummy variables for the willingness of a bank's headquarter state to allow multi-bank holding company acquisitions and/or interstate branching. However, there was insignificant variability in the data (because of the concentration of banks in a relatively small number of states) for these variables to be informative.

forbearance regarding enforcement of bank closure rules. (See Brickley and James (1986).)

Rather than prespecifiying the 1979–1982 period as one of relative deregulation and the pre-1979 and post-1982 periods as ones of relative regulation, we conducted sensitivity tests using the switching regressions methodology of Goldfeld and Quandt (1972, 1973). For our 1978–1985 sample period, this methodology suggested two switch dates and three regimes, 1978, 1979–1982, and 1983–1985.

III. Empirical Results

This relationship among bank risk, ownership structure, and other control variables is first estimated using the following cross-section time-series regression for 38 bankholding companies over the 8-year period 1978–1985.[10]

$$RISK_{it} = a_0 + a_1\, PROP_{it} + a_2 KA_{it} + a_3 FAA_{it} + a_4 TA_{it} + u_{it}, \qquad (2)$$

where

$RISK_{it}$ = one of seven different capital market risk measures (σ_s, σ_ϵ^S, β_m^S, β_I^S, σ_ϵ^L, β_m^L, and β_I^L) for bank i in year t, $i = 1 \cdot \cdot \cdot \cdot 38$ and $t = 1 \cdot \cdot \cdot \cdot 8$;

$PROP_{it}$ = the percentage of stock owned by officers and directors in bank i in year t;

KA_{it} = the book value of capital-assets ratio of bank i in year t;

FAA_{it} = the ratio of *fixed* assets to total assets (operating leverage) of bank i in year t;

TA_{it} = the total assets of bank i in year t.

The regression results for the whole sample period are shown on the first line of each panel in Table I.

Consider first the coefficient on the *PROP* variable. It was hypothesized (H1) that this coefficient should be positively related to bank risk. The results for Table I offer some support for this hypothesis. Of the seven different capital market measures, three coefficients are significant and positive at the 1% level: those for σ_s (total return risk), σ_ϵ^S (unsystematic risk from the two-index model with short-term rates as the second factor), and σ_ϵ^L (unsystematic risk from the two-index model with long-term interest rates as the second factor). Interestingly, the relationship between *systematic* market risk (either β_m^S or β_m^L) and *PROP* is insignificant. This is *consistent* with discretionary risk taking being reflected in the *nonsystematic* risk of the bank rather than its *systematic* risk—as might be expected. Further, the results also imply that discretionary risk taking is not reflected in the interest rate exposure coefficients (β_I^S and β_I^L).

While these results may be of some comfort to well-diversified investors who

[10] The accounting data reflect the aggregated ratios for bank(s) comprising the holding company; i.e., it is constructed from the *Call Report* data for individual banks. This has the advantage of excluding holding company assets that are not directly related to the underlying banks. For a few sample banks, some annual observations were lost because proxy data were incomplete and/or banks within the group merged.

Table I

Estimated Coefficients and *t*-Values (in Parentheses) from Regressing Different Risk Measures of Banking Firms on Ownership Structure and Other Control Variables, Years 1978–1985

$$RISK_{it} = a_0 + a_1\ PROP_{it} + a_2\ KA_{it} + a_3\ FAA_{it} + a_4\ TA_{it} + u_{it}$$

For each risk measure (Panels A through G), the explanatory variables are defined as follows: $PROP_{it}$ is the proportion of outstanding common stock shares held by officers and directors (including shares relating to unexercised stock options) for bank i in year t, KA_{it} is the ratio of book value of capital to assets for bank i in year t, FAA_{it} is the ratio of fixed assets to total assets for bank i in year t, and TA_{it} is the total assets for bank i in year t.

Panel A: Coefficient estimates when $RISK_{it}$ is measured as σ_s, the standard deviation of daily stock returns for bank i in year t

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	.0159	.0152	−.0271	.0225	2.15E-05	.074	4.99	.001	256
	(7.65)	(4.26)	(−.65)	(.35)	(1.71)				
1978	.0124	.0129	−.0062	.0118	3.57E-05	.232	2.04	.116	32
	(3.57)	(2.49)	(−.10)	(.10)	(1.19)				
1979–1982	.0164	.0196	−.0478	.0695	2.31E-05	.199	8.32	.0001	139
	(7.31)	(5.51)	(−1.03)	(.99)	(1.54)				
1983–1985	.0148	.0019	.0532	−.0922	4.65E-06	.007	.15	.963	85
	(2.33)	(.16)	(.42)	(−.64)	(.18)				

Panel B: Coefficient estimates when $RISK_{it}$ is measured as σ_ϵ^S, the standard error of residuals for bank i in year t from the two-index market model using short-term interest rates

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	.0139	.0152	−.0068	.0351	8.07E-06	.080	5.42	.0003	256
	(6.82)	(4.33)	(−.17)	(.57)	(.66)				
1978	.0104	.0134	.0095	.0310	2.08E-05	.270	2.49	.067	32
	(3.15)	(2.71)	(.16)	(.27)	(.73)				
1979–1982	.0141	.0195	−.0210	.0694	1.18E-05	.234	10.24	.0001	139
	(6.83)	(5.98)	(−.49)	(1.07)	(.86)				
1983–1985	.0134	.0020	.0630	−.0715	−1.24E-05	.008	.15	.961	85
	(2.10)	(.17)	(.49)	(−.49)	(−.48)				

Table I—*Continued*

Panel C: Coefficient estimates when $RISK_{it}$ is measured as β_m^S, the beta coefficient of the CRSP equally weighted market index for bank i in year t from the two-index market model using short-term interest rates

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	.7679	.0029	−2.5840	.2984	.0060	.298	26.66	.0001	256
	(6.56)	(.01)	(−1.10)	(.08)	(8.54)				
1978	.9012	−.3163	−6.2710	−3.3876	.0043	.522	7.37	.0004	32
	(4.21)	(−.99)	(−1.64)	(−.45)	(2.34)				
1979–1982	1.0246	.1992	−8.8017	5.3412	.0030	.188	7.75	.0001	139
	(6.78)	(.83)	(−2.83)	(1.13)	(2.95)				
1983–1985	.9106	−.0359	−.9293	−10.2483	.0075	.521	21.77	.0001	85
	(3.73)	(−.08)	(−.19)	(−1.86)	(7.64)				

Panel D: Coefficient estimates when $RISK_{it}$ is measured as β_I^S, the beta coefficient of daily changes in short-term interest rates for bank i in year t from the two-index market model

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	−.0060	−.0051	.1178	−.0621	−4.72E-05	.040	2.60	.037	256
	(−1.67)	(−.81)	(1.60)	(−.55)	(−2.13)				
1978	−.0164	−.0192	.1951	.0630	.0001	.149	1.18	.341	32
	(−1.62)	(−1.27)	(1.08)	(.18)	(1.46)				
1979–1982	−.0059	−.0012	.0449	.1772	−3.15E-05	.118	4.48	.002	139
	(−1.97)	(−.24)	(.73)	(1.89)	(−1.58)				
1983–1985	−.0144	.0001	.4416	−.5341	−.0001	.112	2.53	.046	85
	(−1.23)	(.00)	(1.89)	(−2.03)	(−2.30)				

Panel E: Coefficient estimates when $RISK_{it}$ is measured as σ_ϵ^L, nonsystematic risk measured similarly to σ_ϵ^S with the exception of using long-term interest rates

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	.0142	.0155	−.0110	.0288	6.79E-06	.081	5.51	.0003	256
	(6.94)	(4.41)	(−.27)	(.46)	(.55)				

Table I—*Continued*

Panel E: Coefficient estimates when $RISK_{it}$ is measured as σ_ε, nonsystematic risk measured similarly to σ_ε with the exception of using long-term interest rates

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978	.0105	.0135	.0090	.0307	2.00E-05	.272	2.53	.064	32
	(3.16)	(2.73)	(.15)	(.26)	(.70)				
1979–1982	.0146	.0200	−.0291	.0585	9.33E-06	.236	10.35	.0001	139
	(7.04)	(6.08)	(−.68)	(.90)	(.68)				
1983–1985	.0134	.0020	.0638	−.0707	−1.29E-05	.008	.16	.958	85
	(2.08)	(.16)	(.50)	(−.49)	(−.50)				

Panel F: Coefficient estimtes when $RISK_{it}$ is measured as β_m^L, market risk measured similarly to β_m^S with the exception of using long-term interest rates

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	.7893	.0644	−3.0291	−.2121	.0054	.259	21.95	.0001	256
	(6.74)	(.32)	(−1.29)	(−.06)	(7.61)				
1978	.9252	−.0926	−6.0870	−6.5798	.0034	.457	5.69	.002	32
	(4.29)	(−.29)	(−1.58)	(−.88)	(1.85)				
1979–1982	1.0796	.2174	−9.7628	4.2278	.0021	.166	6.65	.0001	139
	(7.10)	(.90)	(−3.12)	(.89)	(2.10)				
1983–1985	.8992	.0637	−1.1523	−9.1401	.0070	.490	19.21	.0001	85
	(3.75)	(.14)	(−.24)	(−1.69)	(7.27)				

Panel G: Coefficient estimates when $RISK_{it}$ is measured as β_I^L, interest rate risk measured similarly to β_I^S with the exception of using long-term interest rates

Time Period	Intercept	*PROP*	*KA*	*FAA*	*TA*	R^2	*F*-Statistic	*P*-Value	Number of Observations
1978–1985	−.0271	−.0065	.4031	.3900	−.0001	.151	11.18	.0001	256
	(−3.74)	(−.51)	(2.72)	(1.73)	(−2.95)				
1978	−.0092	.0753	.3154	−1.3275	−.0002	.160	1.28	.302	32
	(−.29)	(1.62)	(.57)	(−1.22)	(−.86)				
1979–1982	−.0366	−.0303	.4933	.8074	−.0001	.247	10.98	.0001	139
	(−3.80)	(−1.99)	(2.49)	(2.68)	(−1.49)				
1983–1985	−.0100	.0229	.1822	−.0373	−.0002	.173	4.20	.004	85
	(−.77)	(.94)	(.70)	(−.13)	(−3.26)				

can diversify nonsystematic risk away, regulators are (or should be) concerned with the *total* insolvency risk of a bank reflected by both its σ_s and its σ_e. This has interesting implications for bank examination and surveillance. Specifically, given limited examination resources, our results suggest that regulators might allocate greater time and effort toward monitoring stockholder, rather than managerially, controlled banks; i.e., ownership structure might be used as a flag determining examination frequency.

With respect to the three control variables, KA_{it}, FAA_{it}, and TA_{it}, the results are rather mixed. Both the *KA* and *FAA* variables are generally insignificant, while the *TA* variable is insignificantly related to total and residual risk (σ_s, σ_e^S, σ_e^L) but positively related to β_m^S and β_m^L and *negatively* related to β_I^S and β_I^L.[11] These results imply that bank size has different and offsetting effects on bank market and interest rate risk exposures. That is, larger banks appear to be more sensitive to general market movements but are better able to diversify their interest rate risk exposure.

Regulatory Regimes

As discussed above, we hypothesize (H2) that the manager-stockholder conflict over the degree of risk taking should be exacerbated under periods of deregulation. The switching regression procedure identified three different regimes over the 1978–1985 period which seemed to accord with our a priori expectations regarding periods of relative deregulation (1979–1982) and periods of relative regulation (1978 and 1983–1985). These results are shown on lines, 2, 3, and 4 of each panel in Table I.

As can be seen, the overall relationship between risk and ownership structure is still strongest for the total return risk (σ_s) and nonsystematic risk measures (σ_e^S and σ_e^L). Both the point estimate and the *t*-value for the *PROP* variable are more positive in the 1979–1982 period than in either the 1978 or the 1983–1985 period.[12]

To examine the extent to which risk changes in 1979–1982 period were attributable to the *PROP* variable—i.e., were consistent with stockholders being better able to exploit their put and call risk taking incentives—rather than being due to other factors, we ran the following tests on the *PROP* variable for 1978 vs. 1979–1982, 1979–1982 vs. 1983–1985, and 1978 vs. 1983–1985. Specifically, to test (for example) the change in *PROP* between 1978 and 1979–1982, we ran

$$RISK_{it} = a_0 + a_1 PROP_{it} + a_2 KA_{it} + a_3 FAA_{it} + a_4 INTP12_{it} + a_5 TA_{it} + u_{it}, \quad (3)$$

[11] The Pearson correlation coefficient between bank size (*TA*) and *PROP* was −.29.

[12] In general, the model fitted poorly for 1983–1985. This led us to test for other variables that might be excluded; these included dummy variables for money center banks, time trend dummies, and time interactive dummies. None appeared to offer a ready explanation for the poor fit of the model in this period. However, one possible explanation is that, following increased regulator forbearance surrounding the failure of Continental Illinois in 1984, capital market risk measures considerably underestimated true asset risk given presumptions that big banks were too large to fail. That is, deposit insurance guarantees rose to such an extent that it weakened the link between stock return risk and the risk of the bank's underlying assets.

where

$$INTP12_{it} = PROP_{it} * DUMP12$$

and

$$DUMP12 = 0 \text{ if } 1978,$$

$$DUMP12 = 1 \text{ if } 1979\text{–}1982.$$

Hence, $a_1 + a_4$ is the coefficient on *PROP* for 1979–1982, or a_4 is the *incremental* coefficient relating ownership structure to risk in the 1979–1982 period.

The results, not reported here, show that, in five out of seven cases (σ_s, σ_ε^S, β_m^S, β_I^S, and σ_ε^L), the null hypothesis of *no* change in the risk-ownership structure relationship ($a_4 = 0$) could be rejected. The coefficient a_4 was significantly positive at the 5% level, indicating that the effect of *PROP* on risk taking significantly increased in the 1979–1982 subperiod. However, the null hypothesis could not be rejected for the 1979–1982 vs. 1983–1985 subperiods and in only two cases for 1978 vs. 1983–1985. The results are therefore generally consistent with a change in the risk-ownership structure relationship in the 1979–1982 period only.

Finally, these results are not meant to imply that PROP was the only, or even the major, factor explaining the increase in bank risk in the 1979–1982 period but rather that they are consistent with ownership structure being a contributing factor to the increase in risk taking in this subperiod.

IV. Summary and Conclusion

This paper investigates the relationship between bank ownership structure and risk taking. It is argued that, unlike non-banking firms, the presence of regulators may either accentuate or mitigate bank risk taking incentives. In particular, it is hypothesized that stockholder controlled banks would have call and put option-type value-maximizing incentives to take risks compared to more risk-averse managerially controlled banks (H1) and that risk taking differences between stockholder and managerially controlled banks should become more transparent in periods of deregulation (H2). Using capital market measures of risk and the proportion of stock owned by managers (as a proxy for ownership structure), it is found that there is some support for both H1 and H2.

These results also have an important implication as far as bank failure avoidance is concerned. Specifically, to better monitor bank risk taking in a period of limited examination resources and deregulation, the FDIC and other regulators should increase the relative frequency of examination for stockholder controlled banks. Moreover, changes in ownership structure could be employed as useful early warning flags for bank examiners.

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